

## PREMIUM ROCKWELL HARDNESS TESTERS

ISO6508-ASTM E18

- Analogue
- Basic digital
- Digital
- Hand operated
- Motorized
- Semi-Automatic
- Automatic
- Fully Automatic
- Closed-loop

ESEWAY®





CV-600A



CV-600MA



CV-600MBD

# ROCKWELL HARDNESS TESTING

***The Rockwell Hardness test is a hardness measurement based on the net increase in depth of impression when a load is applied. Hardness values are commonly given in the R, L, M, E and K scales. The higher the value in each of the scales, the harder the material.***

Hardness has been variously defined as resistance to local penetration, scratching, machining, wear or abrasion.

In the Rockwell method of hardness testing, the depth of penetration of an indenter under certain arbitrary test conditions is determined. The indenter may either be a steel ball of some specified diameter or a spherical diamond-tipped cone of  $118^\circ$  angle and 0.2 mm tip radius also called Brale. The type of indenter and the test load determine the hardness scale (A, B, C, etc.)

A minor load of 3 kg or 10 kg is first applied, causing an initial penetration and holding the indenter in place. Then, the dial is set to zero and the major load is applied. Upon removal of the major load, the depth reading is taken while the minor load is still on. The hardness number may then be read directly from the scale.

The Rockwell scale characterizes the indentation hardness of materials through the depth of penetration of an indenter, loaded on a material sample and compared to the penetration in some reference material. It is one of several definitions of hardness in materials science. Its hardness values are noted by HR\* where \* is the letter for the scale used. Hardness relation to strength is that both are measures of the pressure it takes to get plastic deformation to occur in materials.

The Rockwell hardness test was devised by metallurgist Stanley P. Rockwell in Syracuse, NY, circa 1919, in order to quickly determine the effects of heat treatment on steel bearing races. The Brinell hardness test, invented in 1900 in Sweden, was slow, not useful on fully hardened steel, and left too large an impression to be considered nondestructive. Rockwell collaborated with a instrument manufacturer to commercialize his invention and develop standardized testing machines.

## Operation

The determination of the Rockwell hardness of a material involves the application of a minor load followed by a major load, and then noting the depth of penetration, vis à vis, hardness value directly from a dial, in which a harder material gives a higher number. The major advantage of Rockwell hardness is its ability to display hardness values directly, thus obviating tedious calculations involved in other hardness measurement techniques. Also, the relatively simple and inexpensive set-up enables installation under various conditions.





**CV-600D**



**EW-675**



**EW-6000TR**

## 90 YEARS OF ROCKWELL TESTING HISTORY...

Rockwell testers are typically used in engineering, metallurgy and industrial environments. The commercial popularity arises from its speed, reliability, robustness, resolution and small area of indentation.

### Good practices

Cleaning indenter and test-piece to be clear of dirt, grease, rust or paint. Measuring on a perpendicular, flat surface (round work correction factors are invoked to adjust for test-piece curvature). Ensuring that the thickness of the test-piece is at least 10 times the depth of the indentation.

Maintaining an adequate spacing between multiple indentations. Controlling the speed of indentation and assure that the load duration (dwell)time is applied correctly.

### Scales and values

There are several alternative scales, the most commonly used being the "B", and "C" scales. Both express hardness as an arbitrary dimensionless number.

The B-scale is used for softer materials (such as aluminum, brass, and softer steels). It employs a tungsten carbide ball as the indenter and a 100-kg weight to obtain a value expressed as "HRB".

The C-scale, for harder materials, uses a diamond cone and a 150-kg weight to obtain a value expressed as "HRC".

The superficial Rockwell scales use lower loads and shallower impressions on brittle and very thin materials. The 45N scale employs a 45-kg load on a diamond cone-shaped Brale indenter, and can be used on dense ceramics.

The 15T scale employs a 15-kg load on a 1/16-inch diameter hardened steel ball, and can be used on sheet metal. Readings below HRC 20 are generally considered unreliable, as are readings much above HRB 100.

### Typical values

Very hard steel (e.g. a good knife blade):  
HRC 55 - HRC 62

Axes, chisels, etc.: HRC 40 - 45

Several other scales, including the extensive A-scale, are used for specialized applications. There are special scales for measuring case-hardened specimens.

### Standards

International (ISO) ISO 6508-1 :

Metallic materials - Rockwell hardness test - Part 1 :

Test method (scales A, B, C, D, E, F, G, H, K, N, T)

US standard (ASTM International)

ASTM E18 : Standard methods for Rockwell hardness and Rockwell Superficial hardness of metallic materials





Page 6 & 7

**CV-600A**  
Analogue, manual



Page 6 & 7

**CV-600MA**  
Analogue, motorized



Page 6 & 7

**CV-600MA/S**  
Analogue, superficial, motorized



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**CV-600BD**  
Digital, manual



Page 8 & 9

**CV-600MBD**  
Digital, motorized



Page 8 & 9

**CV-600MBD/S**  
Digital, superficial, motorized



Page 10 & 11

**CV-600D**  
Digital, advanced functions



Page 12 & 13

**EW-651**  
Digital, heavy frame



Page 12 & 13

**EW-671**  
Digital, twin scale, heavy frame



Page 14 & 15

**EW-655**  
Digital, touch-screen



Page 14 & 15

**EW-656**  
Digital, easy load, touch-screen



Page 14 & 15

**EW-657**  
Digital, fully automatic





Page 16 & 17

#### EW-675

Touch-screen, twin scale, manual



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#### EW-676

Touch-screen, twin scale, easy load



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#### EW-677

Touch-screen, twin scale, fully automatic



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#### EW-6000R

Rockwell, closed-loop



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#### EW-6000SR

Rockwell, superficial, closed-loop



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#### EW-6000TR

Rockwell, twin scale, closed-loop



Page 20 & 21

#### EW-6000 ESEMASTER

Rockwell, closed-loop, fully automatic, standardized, suitable for calibrating hardness standard blocks



Page 22 & 23

#### DRI SERIES

Universal digital Rockwell indicator. Fits to many types of analogue Rockwell testers



**CV-600A**



**CV-600MA**



**CV-600MA/S**

## ANALOGUE

### Standard delivery

- Main unit
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Spare lamps 6V - 12W (2 pcs) (CV-600MA/S)
- Hardness test block  $\pm 60\text{HRC}$
- Hardness test block  $\pm 25\text{HRC}$
- Hardness test block  $\pm 85\text{HRB}$
- Spare balls 1/16" (5 pcs)
- Flat anvil  $\varnothing 60\text{mm}$
- Large flat anvil  $\varnothing 150\text{mm}$
- V-anvil  $\varnothing 40\text{mm}$
- Power cable (CV-600MA/S)
- Fuse 0.5A (2 pcs) (CV-600MA/S)
- Adjustable feet (4 pcs)
- Spindle protection cover
- Solid accessories case
- CV Instruments certificate
- Installation & user manual

### Optional accessories

- Certified test blocks
- Certified indentors & balls

- CV-600A** - Analogue hand-operated
- CV-600MA** - Analogue motorized
- CV-600MA/S** - Analogue motorized Superficial

- Basic regular Rockwell type tester (CV-600A/MA) and Superficial Rockwell type tester (CV-600MA/S) offering accuracy, reliability and durability at an extremely affordable price
- Rugged construction, will stand up to the harshest environments
- Direct reading of Rockwell scales HRC, B, A, F or Superficial: HRT, HRN
- Accuracy conforms to EN-ISO 6508 and ASTM E-18
- Easy load force selection by robust dial knob
- Oil brake with variable damping by adjustable knob
- Large capacity to accommodate large test specimen
- Electronic control of load duration (dwell time) (CV-600MA & CV-600MA/S)
- Motorized testing procedure (CV-600MA & CV-600MA/S)
- Standard delivery including accessories ready for testing all scales

### Technical specifications

Rockwell scales	Standaard: A, B, C, F (CV-600A/CV-600MA) Superficial: HRT, HRN (CV-600MA/S)
Hardness resolution	0.5 of a Rockwell unit
Test loads	Rockwell 10kgf preload / 60, 100, 150kgf main load Superficial Rockwell 3kgf preload / 15, 30, 45kgf main load
Display	Dial indicator
Test force application	By force lever (CV-600A)
Test cycle	Motorized (preload applied manually)
Load duration	Manually set via oil damper
Dwell time	0-30 sec (5 sec. step) (CV-600MA/S)
Data output	Non
Accuracy	Conforms to EN-ISO 6508 and ASTM E-18
Specimen accommodation	Vertical space 170mm (6.7") Horizontal space (from centre-line) 165mm (6.5")
Specimen access	External surfaces Cylindrical surfaces down to 3mm diameter
Power supply	Non (CV-600A), 220V 50Hz (CV-600MA/CV-600MA-S)
Machine dimensions	Width 150mm, depth 485mm, height 700mm
Machine weight	Approx. 85kg





UP BUTTON  
Increasing dwell time



START BUTTON  
Starts automatic  
measurement



DOWN BUTTON  
Decreasing dwell time



Dwell time indicator



Swivable scale for  
accurate "ZERO" setting



Pre-load indicator



HRB scale



HRC scale

#### Standard delivery





**CV-600BD**

## BASIC DIGITAL

### Standard delivery

- Main unit
- Digital indicator
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Spare lamps 6V - 12W (2 pcs) (CV-600MBD/S)
- Hardness test block  $\pm 60\text{HRC}$
- Hardness test block  $\pm 25\text{HRC}$
- Hardness test block  $\pm 85\text{HRB}$
- Spare balls 1/16" (5 pcs)
- Flat anvil  $\varnothing 60\text{mm}$
- Large flat anvil  $\varnothing 150\text{mm}$
- V-anvil  $\varnothing 40\text{mm}$
- Power cable
- Fuse 0.5A (2 pcs) (CV-600MBD/S)
- Adjustable feet (4 pcs)
- Spindle protection cover
- Solid accessories case
- CV Instruments certificate
- Installation & user manual

### Optional accessories

- Certified test blocks
- Certified indentors & balls



**CV-600MBD**



**CV-600MBD/S**

- CV-600BD** - Basic digital manual
- CV-600MBD** - Basic digital motorized
- CV-600MBD/S** - Basic digital motorized Superficial












- Basic digital regular Rockwell type tester (CV-600BD/MBD) and Superficial Rockwell type tester (CV-600MBD/S) offering accuracy, reliability and durability at an extremely affordable price
- Rugged construction, will stand up to the harshest environments
- Direct reading of Rockwell scales HRC, B, A, F or Superficial: HRT, HRN
- Direct reading of Rockwell scales HRA, B, C, D, E, F, G, K, L, M, P, R, V (CV-600BD/CV-600MBD) Superficial: HRN, T, W, X and Y (CV-600MBD/S)
- Accuracy conforms to EN-ISO 6508 and ASTM E-18
- Easy load force selection by robust dial knob
- Oil brake with variable damping by adjustable knob
- Large capacity to accommodate large test specimen
- Selectable control of load duration (dwell time)
- Motorized testing procedure (CV-600MBD & CV-600MBD/S)
- Rugged construction, will stand up to the harshest environments
- Standard delivery including accessories ready for testing all scales

### Technical specifications

Rockwell scales	Standard: A, B, C, D, E, F, G, K, L, M, P, R, V (CV-600BD/CV-600MBD) Superficial: HRN, T, W, X and Y (CV-600MBD/S)
Hardness resolution	0.5 of a Rockwell unit
Test loads	Rockwell 10kgf preload / 60, 100, 150kgf main load Superficial Rockwell 3kgf preload / 15, 30, 45kgf main load
Display	Dial indicator
Test force application	By force lever (CV-600BD) Motorized load system (CV-600MBD/CV-600MBD/S)
Test cycle	Manual (CV-600BD) Motorized (preload applied manually) (CV-600MBD/CV-600MBD/S)
Load duration	Manually, following display indication (CV-600BD) Automatic (CV-600MBD/CV-600MBD/S)
Dwell time	0-30 sec (5 sec. step)
Measuring protocol	ISO / ASTM / JIS
Indications on display	Progress bar for preload, preload applied, main load applied, dwell time, invalid reading, invalid measurement, invalid procedure, Rockwell value, scale applied
Accuracy	Conforms to EN-ISO 6508 and ASTM E-18
Specimen accommodation	Vertical space 170mm (6.7") Horizontal space (from centre-line) 165mm (6.5")
Specimen access	External surfaces Cylindrical surfaces down to 3mm diameter
Power supply	Input 110\220Volt 50/60Hz
Machine dimensions, weight	Width 150mm, depth 485mm, height 700mm, approx. 85kg





-  **UP BUTTON**  
Increasing dwell time
-  **START BUTTON**  
Starts automatic measurement
-  **DOWN BUTTON**  
Decreasing dwell time
-  **Dwell time indicator**
-  **MENU BUTTON**  
Opens and closes the menu system
-  **ZERO**  
To reset the load bar
-  **OK BUTTON**  
Confirms menu selection
-  **SCALE**  
To select the required Rockwell scale
-  **ON/OFF BUTTON**  
To switch the unit ON or OFF
-  **DOWN BUTTON**  
Moving down through the menu
-  **UP BUTTON**  
Moving up through the menu

#### Standard delivery





**CV-600D**

## ADVANCED DIGITAL

### Standard delivery

- CV-600D main unit
- Built-in thermal printer
- Data-output RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Spare balls 1/16" (5 pcs)
- Flat anvil  $\varnothing$  60mm
- Flat anvil  $\varnothing$  150mm
- V-anvil  $\varnothing$  40mm
- Hardness test blocks:  
 $\pm 60\text{HRC}$ ,  $\pm 40\text{HRC}$ ,  $\pm 85\text{HRB}$
- Power cable
- Fuse 1A (2 pcs)
- Adjustable feet (4 pcs)
- Spindle protection cover
- Solid accessories case
- CV Instruments certificate
- Installation & users manual

### Optional accessories

- Clamping nose
- Certified test blocks
- Certified indentors & balls
- Pedestal spot anvil  $\varnothing$  10mm



## CV-600D - Digital advanced functions

- Digital LCD reading of 15 regular Rockwell scales!
- Conversion to all other hardness scales such as Vickers and Brinell
- Menu operated LCD screen with many functions such as GO/NO GO judgement, Conversions, Load cycle indication, Date, Time
- Integrated printer for test result and statistics
- RS-232 data output to Microsoft Hyperterminal, 'Win Wedge' etc
- Accuracy, reliability and durability at extremely affordable price
- Rugged construction, will stand up to the harshest environments
- Accuracy conforms to EN-ISO 6508 and ASTM E-18
- Easy load force selection by robust dial knob
- Large working space accomodates also larger specimen
- Standard delivery including accessories ready for testing
- Electronic software calibration mode

### Technical specifications

Rockwell scales	A, B, C, D, E, F, G, H, K, L, M, P, R, S, V
Display conversion to	HV, HB, HR scales
Hardness resolution	0.1 of a Rockwell unit
Test loads	60, 100, 150kgf (10kgf preload)
LCD Display	Hardness value, Rockwell scale, Test force indicator, Dwell time, limits with tolerance check GO/NG, number of tests, X-bar average, standard deviation, range R
Data entry	Membrane keypad
Test force application	Automatic main load application
Dwell time	4-99 sec
Data output	Built-in printer and RS-232C
Accuracy	Conforms to EN-ISO 6508 and ASTM E-18
Specimen accommodation	Vertical space 170mm (6.7") Horizontal space (from centre-line) 165mm (6.5")
Specimen access	External surfaces, Cylindrical surfaces down to 3mm diameter
Power supply	220/240V 50Hz
Machine dimensions	227mm x 516mm x 715mm
Net weight	85kg





SCALE

SCALE BUTTON  
To select the required  
Rockwell scale



UP BUTTON  
Moving up through  
the menu



PRINT BUTTON  
Print single values  
and/or statistics



RIGHT BUTTON  
Moving right through  
the menu



DEL BUTTON  
To delete the current  
operation



MENU BUTTON  
Opens and closes  
the menu system



RESET BUTTON  
The system will reset to  
manufacturing status



OK BUTTON  
Confirms menu  
selection



LEFT BUTTON  
Moving left through  
the menu



DOWN BUTTON  
Moving down through  
the menu



CLEAR BUTTON  
To clear the displacement  
value



ESC BUTTON

#### Standard delivery





**EW-651**

## BASIC DIGITAL

### Standard delivery

- Main unit
- Built-in printer
- Data-output USB2 and RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Rockwell testing balls
- Flat testing anvil  $\varnothing$  60mm
- Flat anvil  $\varnothing$  150mm
- V-anvil 40mm
- Hardness test blocks:  
± 60 HRC, ±40 HRC, ±85 HRB
- Power cable
- Spare fuse
- Adjustable feet (4 Pcs)
- Spindle protection cover
- Machine cover
- Solid accessories case
- ESEWAY® certificate
- User and installation manual

### Optional accessories

- Clamping and indenter protection nose
- UKAS, DKD, ASTM/NIST Certified test blocks
- UKAS, DKD, ASTM/NIST Indentors & balls
- Pedestal spot anvil
- Special support systems for large work pieces
- Tester stand with cabinet

**Available  
07/2008**



**EW-671**

**EW-651**  
**EW-671**

- Basic digital, motorized, heavy frame
- Basic digital, TWIN scale, motorized, heavy frame












- Basic digital regular Rockwell type tester (EW-651) and TWIN scale Rockwell type tester (EW-671) with heavy frame, for large workpiece dimension, offering great stability, reliability and durability
- Rugged construction, will stand up to the harshest environments
- Direct reading of Rockwell scales HRA,B,C,D,E,F,G,K,L,M,P,R,V and Superficial: HRN, T, W, X and Y
- Accuracy conforms to EN-ISO 6508 and ASTM E-18
- Easy load force selection by robust dial knob
- Oil brake with variable damping by adjustable knob
- Large capacity to accommodate large test specimen
- Selectable control of load duration (dwell time)
- Motorized testing procedure (CV-600MBD & CV-600MBD/S)
- Rugged construction, will stand up to the harshest environments )
- Standard delivery including accessories ready for testing all scales

### Technical specifications

Rockwell scales	Standard A,B,C,D,E,F,G,K,L,M,P,R,V Superficial (EW-671) HRN, T, W, X and Y
Conversion to	HV, HB, other HR scales
Hardness resolution	0.1 or 0.01 of a Rockwell unit
Pre-load	10kgf (EW-651) / 3kgf-10kgf (EW-671)
Main loads	60, 100, 150kg (EW-651), 15, 30, 45, 60, 100, 150kg (EW-671)
Pre-load application	Manual
Test load application	Motorized
Data output	Built in high speed printer & USB2
LCD Display	Hardness value, conversion value, test force indicator, dwell time, memory contents, all machine settings, go / no go, all statistics
Specimen accommodation	Vertical space 275mm Horizontal space (from centre of elevator) 190mm
Power supply	110/240V, 50 – 60Hz
Machine dimensions	Approx. 940mm x 390mm x 670mm (HxWxD)
Net weight	Approx. 140kg
<b>EW-651 BASIC™</b>	Manual load selection Manual elevator lead screw
<b>EW-671 BASIC™</b>	Manual load selection Manual elevator lead screw





-  **UP BUTTON**  
Increasing dwell time
-  **START BUTTON**  
Start automatic measurement
-  **DOWN BUTTON**  
Decreasing dwell time
-  **Dwell time indicator**
-  **MENU BUTTON**  
Opens and closes the menu system
-  **ZERO BUTTON**  
To reset the load bar
-  **OK BUTTON**  
Confirms menu selection
-  **SCALE BUTTON**  
To select the required Rockwell scale
-  **ON/OFF BUTTON**  
To switch the unit ON or OFF
-  **DOWN BUTTON**  
Moving down through the menu
-  **UP BUTTON**  
Moving up through the menu

#### Standard delivery



Clamping protection  
nose optional



**EW-655**



**EW-656**



**EW-657**

## TOUCH-SCREEN DIGITAL

### Standard delivery

- Main unit
- Built-in printer
- Data-output USB2 and RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Rockwell testing balls
- Flat testing anvil  $\varnothing$  60mm
- Flat anvil  $\varnothing$  150mm
- V-anvil 40mm
- Hardness test blocks:  
 $\pm 60$  HRC,  $\pm 40$  HRC,  $\pm 85$  HRB
- Power cable
- Spare fuse
- Adjustable feet (4 Pcs)
- Spindle protection cover
- Machine cover
- Solid accessories case
- ESEWAY® certificate
- User and installation manual

### Optional accessories

- Clamping and indenter protection nose
- UKAS, DKD, ASTM/NIST Certified test blocks
- UKAS, DKD, ASTM/NIST Indentors & balls
- Pedestal spot anvil
- Special support systems for large work pieces
- Tester stand with cabinet

## ROCKWELL

For combined Twin testers, see page 16

**EW-655 ESETOUCH™** Digital, touch-screen  
**EW-656 ESELOAD™** Digital, easy load, touch-screen  
**EW-657 ESEMATIC™** Digital, fully automatic

- Measures all standard Rockwell hardness values
- Superior GR & R results!
- Simultaneous conversion to HV, HB and other HR scales
- Rugged fine casted frame, allowing large dimension work pieces
- ASTM, ISO, JIS compliant
- ESELOAD™ unique motorized load application system, auto selection of loads depending on HR scale (EW-656 & EW-657 only)
- Superior depth measuring system through Heidenhain (Germany) transducer
- ESETOUCH™ advanced LCD touch screen & operator panel with user friendly menu operation in multiple languages
- High speed preload, loading and unloading procedure for ultra high efficiency
- ESELIFT™ (657 and 677 only) motorized elevating screw simplifies and speeds up test operation
- Automatic measurement procedure, load / dwell / unload (655 & 656 models)
- ESEMATIC™ fully automatic positioning and measuring procedure (positioning, preload, load, dwell, unload (657 only)
- Storage of 50 test programs and tester settings, allowing you to set up your tester in just seconds
- Alpha numerical data entry
- Continuous automatic "online" statistics, incl. average of readings etc.
- Storage of 20,000 single hardness values
- Go / No Go mode
- Convex and concave measuring mode
- Calibration date expired (reminder)
- Service mode including electronic linearity calibration, tests counter, maintenance system
- Prints statistics to built-in printer or external printer
- Connects with PC or SPC network via built-in bi-directional USB2 connector

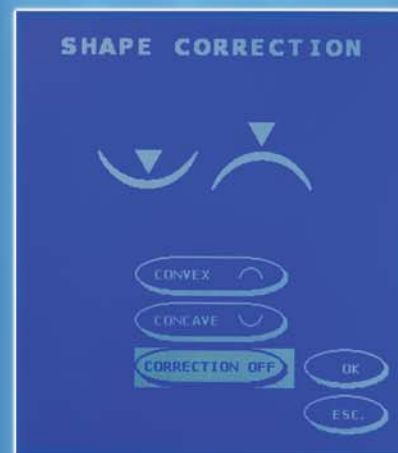
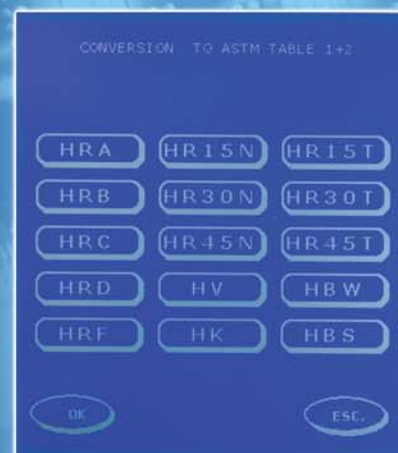
The EW-657 ESEMATIC™ model features standard a fully automatic system for high speed production measurement.





### Technical specifications

Rockwell scales	A,B,C,D,E,F,G,K,L,M,P,R,V
Conversion to	HV, HB, other HR scales
Hardness resolution	0.1 or 0.01 of a Rockwell unit
Pre-load	10kgf
Main loads	60, 100, 150kg
Pre-load application	Manual (automatic for 657 ESEMATIC™)
Test load application	Fully automatic
Data output	Built in high speed printer & USB2
LCD Display	Hardness value, conversion value, test force indicator, dwell time, memory contents, all machine settings, go / no go, all statistics
Specimen accommodation	Vertical space 275mm Horizontal space (from centre of elevator) 190mm
Power supply	110/240V, 50 – 60Hz
Machine dimensions	Approx. 940mm x 390mm x 670mm (HxWxD)
Net weight	Approx. 140kg





**EW-675**



**EW-676**



**EW-677**

## DIGITAL TOUCH-SCREEN

### Standard delivery

- Main unit
- Built-in printer
- Data-output USB2 and RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Rockwell testing balls
- Flat testing anvil  $\varnothing$  60mm
- Flat anvil  $\varnothing$  150mm
- V-anvil 40mm
- Hardness test blocks:  
± 60 HRC, ±40 HRC, ±85 HRB
- Power cable
- Spare fuse
- Adjustable feet (4 Pcs)
- Spindle protection cover
- Machine cover
- Solid accessories case
- ESEWAY® certificate
- User and installation manual

### Optional accessories

- Clamping and indenter protection nose
- UKAS, DKD, ASTM/NIST Certified test blocks
- UKAS, DKD, ASTM/NIST Indentors & balls
- Pedestal spot anvil
- Special support systems for large work pieces
- Tester stand with cabinet

## ROCKWELL/ROCKWELL SUPERFICIAL

- |                         |  |
|-------------------------|--|
| <b>EW-675 ESETOUCH™</b> | <b>Touch-screen, twin scale, manual</b>          |
| <b>EW-676 ESELOAD™</b>  | <b>Touch-screen, twin scale, easy load</b>       |
| <b>EW-677 ESEMATIC™</b> | <b>Touch-screen, twin scale, fully automatic</b> |

- Measures all Standard & Superficial Rockwell hardness values
- Superior GR & R results!
- Simultaneous conversion to HV, HB and other HR scales
- Rugged fine casted frame allowing large dimension work pieces
- ASTM, ISO, JIS compliant
- ESELOAD™ unique motorized load application system, auto selection of loads depending on HR scale (676 & 677 only)
- Superior depth measuring system through Heidenhain (Germany) transducer
- ESETOUCH™ advanced LCD touch screen & operator panel with user friendly menu operation in multiple languages
- High speed preload, loading and unloading procedure for ultra high efficiency
- ESELIFT™ (677 only) motorized elevating screw simplifies and speeds up test operation
- Automatic measurement procedure, load / dwell / unload (677 only)
- ESEMATIC™ fully automatic positioning and measuring procedure (positioning, preload, load, dwell, unload (676 and 677 models)
- Storage of 50 test programs and tester settings, allowing you to set up your tester in just seconds
- Alpha numerical data entry
- Continuous automatic "online" statistics, incl. average of readings etc.
- Storage of 20,000 single hardness values
- Go / No Go mode
- Convex and concave measuring mode
- Calibration date expired (reminder)
- Service mode including electronic linearity calibration, tests counter, maintenance system
- Prints statistics to built-in printer or external printer
- Connects with PC or SPC network via built-in bi-directional USB2 connector

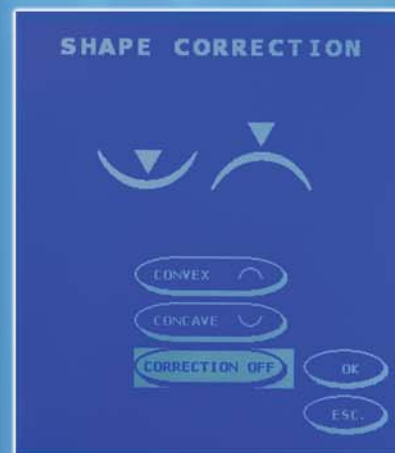
The EW-677 ESEMATIC™ model offers standard a fully automatic system for high speed production measurement.





#### Technical specifications

Rockwell scales	Standard	A,B,C,D,E,F,G,K,L,M,P,R,V
	Superficial	15N, 30N, 45N, 15T, 30T, 45T, 15W, 30W, 45W, 15X, 30X, 45X, 15Y, 30Y, 45Y
Conversion to	HV, HB, other HR scales	
Hardness resolution	0.1 or 0.01 of a Rockwell unit	
Pre-load	3kgf / 10kgf	
Main loads	15, 30, 45, 60, 100, 150kg	
Pre-load application	Manual (automatic for 677 ESEMATIC™)	
Test load application	Fully automatic	
Data output	Built-in high speed printer & USB2	
LCD Display	Hardness value, conversion value, test force indicator, dwell time, memory contents, all machine settings, go / no go, all statistics	
Specimen accommodation	Vertical space 275mm	
	Horizontal space (from centre of elevator shaft) 190mm	
Power supply	110/240 volt, 50 – 60Hz	
Machine dimensions	Approx. 940mm x 390mm x 670mm (HxWxD)	
Net weight	Approx. 140 kg	



Clamping protection nose optional



**EW-6000R**



**EW-6000SR**



**EW-6000TR**

## LOAD-CELL CLOSED LOOP

### Standard delivery

- Main unit
- Built-in printer
- Data output RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Rockwell testing balls
- Flat testing anvil  $\varnothing$  60mm
- Flat anvil  $\varnothing$  150mm
- V-anvil 40mm
- Hardness test blocks:  
 $\pm 60$  HRC,  $\pm 40$  HRC,  $\pm 85$  HRB
- Power cable
- Spare fuse
- Adjustable feet (4 Pcs)
- Spindle protection cover
- Machine cover
- Solid accessories case
- ESEWAY® certificate
- User and installation manual

### Optional accessories

- Computer controlled auto traversing option
- UKAS, DKD, ASTM/NIST Certified test blocks
- UKAS, DKD, ASTM/NIST Indentors & balls
- Pedestal spot anvil
- Heavy load testing tables
- Special support systems for large work pieces
- Tester stand with cabinet

**EW-6000 R™**  
**EW-6000 SR™**  
**EW-6000 TR™**

**Rockwell, closed-loop**  
**Rockwell, superficial, closed-loop**  
**Rockwell, twin scale, closed-loop**

The ESEWAY 6000 offers a superior designed, electronic closed-loop control system for high accuracy and repeatability while maintaining fast measurement speed.

A closed-loop hardness tester that utilizes a step motor optical encoder and a load cell to apply and regulate the test force and to obtain high accurate hardness values.

The ESEWAY closed-loop electronic load control system eliminates potential errors which could be associated with deadweight testers.

The ESEWAY 6000 features a system where the indenter is directly fixed on the load cell and the digital/optical depth measurement system is directly mounted on the load cell fixture, on one axis. This design guarantees an absolute friction free testing of your workpiece.

- Measures at choice Standard, Superficial or combined Rockwell hardness values
- Superior GR & R results!
- Simultaneous conversion to HV, HB and other HR scales
- Rugged fine casted frame allowing large dimension work pieces
- ASTM E18, ISO 6508, EN and all other applicable standards
- Unique closed loop and load cell combined system, guaranteeing that pre- and main load are applied with absolute accuracy, no variety between testers and independence of the operator skills
- Superior depth measuring system through high precision Heidenhain (Germany) glass scale
- No elevating screw, simplifies test operation and enhances accuracy
- Storage of 50 test programs and tester settings, allowing you to set up your tester in just seconds
- Alpha numerical data entry
- Continuous automatic "online" statistics, incl. average of readings etc.
- Storage of 20,000 single hardness values
- Go / No Go mode
- Convex and concave measuring mode
- Calibration date expired (reminder)
- Service mode including tests counter, maintenance system
- Prints statistics to built-in printer or external printer
- Connects with PC or SPC network via built-in bi-directional RS232C connector





Indenter fixed directly on load cell



#### Technical specifications

Rockwell scales	Standard	A, B, C, D, E, F, G, H, K, L, M, P, R, V
	Superficial	15N, 30N, 45N, 15T, 30T, 45T, 15W, 30W, 45W, 15X, 30X, 45X, 15Y, 30Y, 45Y
Conversion to	HV, HB, other HR scales	
Hardness resolution	0.1 & 0.01 of a Rockwell unit	
Pre-load	3kgf / 10kgf	
Main loads	15, 30, 45, 60, 100, 150kg through controlled closed loop system	
Pre-load application	Fully automatic	
Test load application	Fully automatic	
Data output	Built-in high speed printer & RS 232C	
LCD Display	Hardness value, conversion value, test force indicator, dwell time, memory contents, all machine settings, go / no go, all statistics, and many more	
Specimen accommodation	Vertical space 250mm	
	Horizontal space (from centre of elevator shaft) 220mm	
Power supply	110/240V, 50 – 60Hz	
Machine dimensions	Approx. 940mm x 390mm x 670mm (HxWxD)	
Net weight	Approx. 120kg	

See next page (EW6000 ESEMASTER) for screen prints





**EW-6000 ESEMASTER**

**LOAD-CELL  
CLOSED LOOP  
MASTER**

<b>43.3<sup>READY</sup>HRC</b>	
CONVERSION: NONE	ASTM T1
USER PROGRAM : P2 STANDARD HRC TEST	
TEST FORCE : 150	KGF
APPL. TIME : 2	SEC
DMELL TIME : 5	SEC
INDENTER : DIAMOND	
NO:04 X:57.7 S.DEV:8.3 R:19.5	

TEST TIME	7.0s
<b>HRC TESTING</b>	
PLEASE WAIT	

USER PROGRAM - ADD P15			
REMARK	CONVERSION		
NO. REMARK	NONE	ASTM T1	
SCALE	HRA	UP-LIM	0.0
SHAPE CORR.	OFF	LOW-LIM	0.0
PRE-LOAD (SEC)		MAIN LOAD (SEC)	
APPL. TIME	2	APPL. TIME	2
DMELL TIME	5	DMELL TIME	5
SELECT:↑ ↓ ← → CONFIRM:OK SAVE:SAVE			

USER PROGRAM - EDIT		
No.	SCALE	REMARK
P0	HRA	STANDARD HRA TEST
P1	HRB	STANDARD HRB TEST
P2	HRC	STANDARD HRC TEST
P3	HRD	STANDARD HRD TEST
P4	HRE	STANDARD HRE TEST
P5	HRF	STANDARD HRF TEST
P6	HRG	STANDARD HRG TEST
P7	HRH	STANDARD HRH TEST
SELECT:↑ ↓ ← → CONFIRM:OK RETURN:ESC		

### EW-6000 ESEMASTER™

**Rockwell, closed-loop,  
fully automatic, standardized,  
suitable for calibrating hardness  
standard blocks**

Rockwell hardness numbers are the result of measuring the depth of indentation in to the material. Therefore the accuracy and resolution of this measurement is critical. The 6000 series MASTER model features even higher accuracy as the standard 6000 series testers. The optical scale is now fit to read in nano's. The firmware of the tester is enhanced to compute this high definition output to superior accuracy numbers. The nano optical measurement system, in combination with a high accurate load cell are the heart of this MASTER Rockwell tester.

The 6000 MASTER is build in series as a verification tester that can be used in laboratories for certifying test blocks or hardness standards for various purposes.

The closed loop system of the 6000 eliminates potential errors which could be associated with dead weight testers.

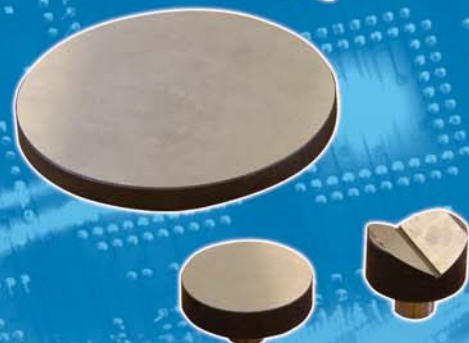
The absolute friction free construction with the indenter directly assembled on the load cell and a **nano** scale depth reading system offers one of the most reliable and easy to use systems available on the market.

The 6000 MASTER can be equipped with various systems such as a computer controlled motorized coordinate table to set all kind of traverse patterns.

The 6000 MASTER is our top of the range tester, a new reference in Rockwell hardness testing!

- Measures at choice Standard, Superficial or combined Rockwell hardness values
- Superior GR & R results!
- Simultaneous conversion to HV, HB and other HR scales
- Rugged fine casted frame allowing large dimension work pieces
- ASTM E18, ISO 6508, EN and all other applicable standards
- Unique closed loop and load cell combined system, guaranteeing that pre- and main load are applied with absolute accuracy, no variety between testers and independence of the operator skills
- Superior depth measuring system through high precision Heidenhain (Germany) glass scale
- No elevating screw, simplifies test operation and enhances accuracy
- Storage of 50 test programs and tester settings, allowing you to set up your tester in just seconds
- Alpha numerical data entry
- Continuous automatic "online" statistics, incl. average of readings etc.
- Storage of 20,000 single hardness values
- Go / No Go mode
- Convex and concave measuring mode
- Calibration date expired (reminder)
- Service mode including tests counter, maintenance system
- Prints statistics to built-in printer or external printer
- Connects with PC or SPC network via built-in bi-directional RS232C connector





## EW-6000 ESEMASTER

# LOAD-CELL CLOSED LOOP MASTER

### Technical specifications

Rockwell scales	Standard Superficial	A, B, C, D, E, F, G, H, K, L, M, P, R, V 15N, 30N, 45N, 15T, 30T, 45T, 15W, 30W, 45W, 15X, 30X, 45X, 15Y, 30Y, 45Y
Conversion to	HV, HB, other HR scales	
Hardness resolution	0.1 & 0.01 of a Rockwell unit	
Pre-load	3kgf / 10kgf	
Main loads	15, 30, 45, 60, 100, 150kg through controlled closed loop system	
Pre-load application	Fully automatic	
Test load application	Fully automatic	
Data output	Built-in high speed printer & RS 232C	
LCD Display	Hardness value, conversion value, test force indicator, dwell time, memory contents, all machine settings, go / no go, all statistics, and many more	
Specimen accommodation	Vertical space 250mm Horizontal space (from centre of elevator shaft) 220mm	
Power supply	110/240V, 50 – 60Hz	
Machine dimensions	Approx. 940mm x 390mm x 670mm (HxWxD)	
Net weight	Approx. 120kg	

### Standard delivery

- Main unit
- Built-in printer
- Data output RS-232C
- Diamond Rockwell indenter
- Rockwell ball indenter 1/16"
- Rockwell testing balls
- Flat testing anvil ø 60mm
- Flat anvil ø 150mm
- V-anvil 40mm
- Hardness test blocks:  
±60 HRC, ±40 HRC, ±85 HRB
- Power cable
- Spare fuse
- Adjustable feet (4 Pcs)
- Spindle protection cover
- Machine cover
- Solid accessories case
- ESEWAY® certificate
- User and installation manual

### Optional accessories

- Computer controlled auto traversing option
- UKAS, DKD, ASTM/NIST  
Certified test blocks
- UKAS, DKD, ASTM/NIST  
Indentors & balls
- Pedestal spot anvil
- Heavy load testing tables
- Special support systems for large work pieces
- Tester stand with cabinet

***"Complying to ISO 6508 or latest ASTM-E18 won't be so expensive..."***



#### **DRI SERIES**

## **OEM (RETROFIT) UNIVERSAL DIGITAL INDICATOR**

### **INCORRECT READING ON ANALOGUE GAUGES**

Reading values on an analogue Rockwell scale (indicator), is far from ideal and very often leads to miss-reading while wrong interpretation of the indicator position can cause confusion or misunderstanding of the actually measured hardness values. Incorrect hardness values can lead to damages of components and constructions. In the worst case incorrect readings can even result in the loss of lives. Analogue hardness testers are still commonly sold, due to their low cost and simple measurement procedure.

### **OEM (RETROFIT) UNIVERSAL DIGITAL INDICATOR**

Rockwell specialist CV Instruments has developed a UNIVERSAL DIGITAL ROCKWELL INDICATOR that fits in a wide range of Rockwell Hardness testers, in many cases regardless of the manufacturer of the hardness tester itself. As the Rockwell and Superficial Rockwell testing procedure demands highly accurate depth readings, a new sensor has been developed and applied to ensure that the penetration of the indenter in the tested object, is measured with an accuracy of 0.001mm or better. Well within the applicable ISO/ASTM or JIS standards. More accurate results can be obtained from your new or old analogue testers, while at the same time its easier to read the measured values. No need to buy new equipment or make large investments.

### **SOFTWARE INTELLIGENCE**

Your tester now becomes a more reliable and more accurate instrument, regardless of the operator skills. Intelligent detection of pre-load and main load application in combination with acoustic and visual warnings.

### **POWER SUPPLY**

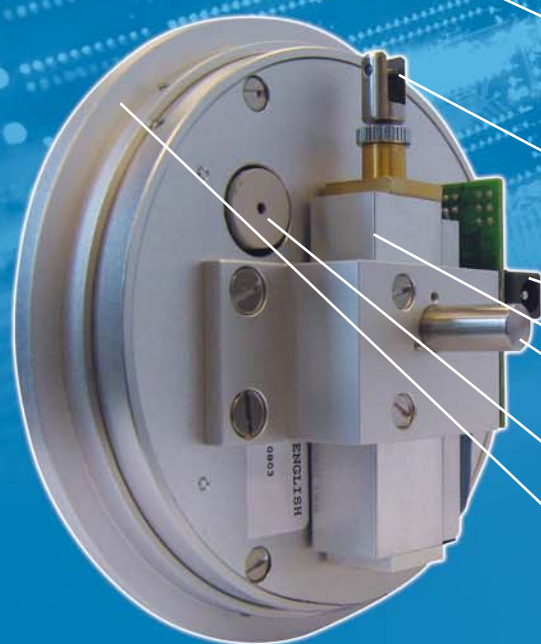
The UNIVERSAL Rockwell indicator comes with a CE approved power supply and connects with main power as easily as your mobile phone. Optionally you can order a rechargeable battery pack, allowing the indicator to work without the need of main power for at least 36 hours continuously.

### **ADVANTAGES OF THE CV INSTRUMENTS DIGITAL ROCKWELL INDICATOR**

- Large back-lit LCD display with load progress bar gives visual control over the load application process
- Avoids reading error and increases efficiency of your Rockwell hardness tester
- Superior accurate readings even from your old, but properly working hardness tester
- Low cost improvement and easy updating of your current Rockwell tester
- Automatic measuring procedure after pre-load has been reached
- Automatic conversion to all common Rockwell scales
- Automatic ISO / ASTM procedure function (can be switched off)
- Easy to install on many types and brands of Rockwell hardness testers

**Universal digital Rockwell indicator.  
Fits to many types of analogue Rockwell testers,  
also those of other manufacturers.  
(ask our sales department for more details)**





**MENU BUTTON**  
Opens and closes the menu system



**ZERO BUTTON**  
To reset the load bar



**OK BUTTON**  
Confirms your menu selection



**SCALE BUTTON**  
To select the required Rockwell scale



**ON/OFF BUTTON**  
To switch the unit ON or OFF



**DOWN BUTTON**  
Moving down through the menu



**UP BUTTON**  
Moving up through the menu

Indenter lever fixture

Low voltage power connector

Sensor

Indicator fixture fits many brands and types of testers

Buzzer for acoustic alarms

Adjustable front / spacer

**CV-DRG01** Rockwell and Superficial scales, English menu.  
**CV-DRG02** Rockwell and Superficial scales, Chinese menu.  
**CV-DRG03** Rockwell and Superficial scales, German menu.  
(For both manual and motorized hardness testers)

#### Technical details

Rockwell scales	A,B,C,D,E,F,G,K,L,M,P,R,V
Superficial Rockwell scales	15N, 30N, 45N, 15T, 30T, 45T, 15W, 30W, 45W, 15X, 30X, 45X, 15Y, 30Y, 45Y
Indications on display	Progress bar for preload, preload applied, main load applied, dwell time, invalid reading, invalid measurement, invalid procedure, Rockwell value, scale applied
Measuring protocol	ISO / ASTM / JIS
Sensor	INNOVATECH – INCDC/0702
System accuracy	<0,002mm / 0,5 HRC
Display	Blue/white backlit graphical LCD
Power supply	9Volt DC – 800mA
Standard accessories	8mm stem on backside, adjustable front spacer, power adapter, user manual, quality certificate, assembly instructions

WWW.CVI-EUROPE.COM

**For your local distributor, please contact:**

**CV Instruments Europe BV**

Borgharenweg 140  
6222 AA Maastricht  
The Netherlands

Telephone: +31 43 352 0060  
Fax: +31 43 363 1168  
Email: [sales@cv-europe.com](mailto:sales@cv-europe.com)  
[www.cvi-europe.com](http://www.cvi-europe.com)

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Analogue ☒

Basic digital ☒

Digital ☒

Hand operated ☒

Motorized ☒

Semi-Automatic ☒

Automatic ☒

Fully Automatic ☒

Closed-loop ☒